Volunteer Lake Assessment Program Individual Lake Reports
WAUKEWAN, LAKE, NEW HAMPTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	7,551	Max. Depth (m):	21.4	Flushing Rate (yr¹)	0.6
Surface Area (Ac.):	913	Mean Depth (m):	6.7	P Retention Coef:	0.7
Shore Length (m):	13,000	Volume (m³):	24,809,000	Elevation (ft):	539

TROPHIC CLASSIFICATION

Year	Trophic class
1982	OLIGOTROPHIC
1994	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Bad	There are >10% of samples (minimum of 2), exceeding criteria with one or more samples considered large exceedance.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WAUKEWAN - TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	14.6	Barren Land	0.02	Grassland/Herbaceous	0.79
Developed-Open Space	3	Deciduous Forest	25.15	Pasture Hay	1.08
Developed-Low Intensity	1.29	Evergreen Forest	9.6	Cultivated Crops	0.74
Developed-Medium Intensity	0.56	Mixed Forest	39.35	Woody Wetlands	1.81
Developed-High Intensity	0.14	Shrub-Scrub	1.83	Emergent Wetlands	0.05

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

- **CHLOROPHYLL-A:** Chlorophyll levels decreased slightly from the beginning of July to the end, and then increased slightly in August. Chlorophyll levels remained low and much less than the state median. Average chlorophyll levels were the lowest measured since monitoring began! Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.

- **CONDUCTIVITY/CHLORIDE:** Deep spot, Inlet, Perkins Cove, and Sayward Bk. conductivity and chloride levels remained slightly elevated and greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began. EE Brook, Mayo Farm Bk. and Camp Rd. Trib. conductivity and chloride levels were low and approximately equal to the state medians.

- **TOTAL PHOSPHORUS:** Epilimnetic total phosphorus was very low on each sampling event and was the lowest measured since monitoring began. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus levels since monitoring began. We hope to see this continue! Metalimnetic (middle water layer) and hypolimnetic (lower water layer) phosphorus levels remained stable and low on each sampling event. Tributary phosphorus levels were low except for Sayward Bk. phosphorus levels were slightly elevated in May. A beaver dam upstream may be the cause of the slightly higher phosphorus levels.

- **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was lower in early July due to small waves affecting Secchi disk viewing. Transparency improved in later July and remained stable in August. Transparency measured with the viewscope (VS) was good on each sampling event. Average transparency remains much better than the state median and historical trend analysis indicates stable transparency since monitoring began.

- **TURBIDITY:** Epilimnetic turbidity was slightly higher in early July following a significant rain event, but turbidity decreased to low levels in late July and August. Metalimnetic turbidity remained low on each sampling event. Hypolimnetic turbidity was average for that station. Tributary turbidities were relatively low except for Sayward Bk. turbidity was slightly elevated in May. A beaver dam upstream may be the cause. Also, Perkins cove turbidity was higher in June potentially due to the significant storm event prior to sampling.

- **PH:** Epilimnetic and metalimnetic pH levels were within desirable range 6.5—8.0 units however hypolimnetic pH was less than desirable. Historical trend analysis indicates relatively stable epilimnetic pH since monitoring began.

- **RECOMMENDED ACTIONS:** Water quality appears to have improved, with the exception of conductivity. Winter de-icing activities in the watershed have likely contributed to the worsening conductivity in the lake. If not done already, encourage local road agents and winter maintenance companies to obtain a Voluntary NH Salt Applicator license through UNH's Technology Transfer Center's Green SnowPro Certification program. Visit www.t2.unh.edu/green-snowpro-training-and-certification for more information and education resources. Encourage local lake and watershed residents to utilize best management practices for applying de-icing materials on their driveways and walkways. Expand monitoring program to collect water quality data from major tributaries on a monthly basis to better assess pollutant loads to the lake. Keep up the great work!

Station Name	Table 1. 2014 Average Water Quality Data for LAKE WAUKEWAN, MAYO STN.								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	5.97	1.16	21	105.9	3	6.58	7.33	0.75	6.99
Metalimnion				105.7	5			0.76	6.87
Hypolimnion				104.8	6			1.01	6.44
EE Brook			3	36.4	7			0.36	6.70
Inlet			17	86.6	5			0.59	6.87
Mayo Farm Bk			4	41.1	7			0.56	6.67
Perkins Cove			22	109.2	6			0.74	6.99
Sayward Bk			25	133.8	13			1.85	6.93
Camp Rd Trib			6	46.5	6			0.87	6.47

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

Chloride: > 230 mg/L (chronic)

E. coli: > 88 cts/100 mL – public beach

E. coli: > 406 cts/100 mL – surface waters

Turbidity: > 10 NTU above natural level

pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

Alkalinity: 4.9 mg/L

Chlorophyll-a: 4.58 mg/m^3

Conductivity: 40.0 uS/cm

Chloride: 4 mg/L

Total Phosphorus: 12 ug/L

Transparency: 3.2 m

pH: 6.6

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data